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TRENDS IN THE HIGHWAY MARKET FOR WOOD PRODUCTS

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Abstract.—Forty-eight million cubic feet of wood products, about 50 million dollars worth, were used in the Nation's highway construction program in 1972. Expenditures for highway construction increased 2½ times from 1954 to 1972. The volume of wood products used in highway construction changed little during this period because other materials were substituted for wood products for both structural forms and structure members.

Key words: wood use on highways; highway market; highway construction

Since World War II, expenditures for highway construction have increased on an average of about 9 percent annually. There has also been an increase in use of construction materials. The use of wood products, however, has not kept pace with the use of other materials.

Wood products are only a small part of the total cost of highway construction. But in 1972, the highway market consumed about 50 million dollars worth of wood products. Thus, this market is an important one for wood producers.

This report includes a summary of trends in the use of lumber, piling, and posts in highway construction in the United States. It also includes a description of the products and how they are used, estimates of the quantities used, and a discussion of trends in use.

Procedure

This report was compiled from information obtained from the Federal Highway Administration, state highway officials, and road contractors. I estimated the quantities of wood products used by applying the material usage factor for each product to the amount of money expended for highway construction. (A material usage factor is the units of a

given material used per million dollars of construction costs.)

The lumber usage factor includes lumber, plywood, and building board. It does not include the wood products used for signs, sign posts, and light standards. An estimated 60 percent is lumber, and 40 percent is plywood and building board; building board is a relatively minor component. Post usage factors are not available.

The total number of posts installed was estimated from usage factors for the lineal feet of guardrail and fence installed. Guardrail posts were assumed to be spaced 6¼ feet apart, and fence posts were assumed to be 10 feet apart. An estimated 50 percent of the guardrail and fence posts installed are wood.

Wood Use on Highways

Lumber and plywood are used for shoring, scaffolding, formwork, and falsework in building bridges, drainage facilities, and other highway structures. Lumber, plywood, and building board are also used as an itegral part of bridges and buildings at rest areas. Posts are used for guardrails and for fencing the right-of-way. Piling is used to support bridges and other structures in swampy and sandy areas.

Nearly all the wood products used in highway construction are softwoods. Most of the hardwoods used are for guardrail posts. Treated wood products are used for bridges, guardrail posts, fence posts, and piling. Plywood used for structural forms is often oil-treated or plastic-coated.

Structural form lumber and plywood are purchased in standard sizes and are cut to the required sizes at the job site; these materials are often reused. Structural lumber and piling are generally special-order items, cut and finished to design specifications.

Guardrail posts are either round or sawed and are about 6 feet long. Sawed posts are usually 6 x 8 inches or 8 x 8 inches in cross section, and round posts are 6 to 8 inches in

Table 1.—Construction expenditures[a] for all public highways, roads, and streets and estimates on the wood product volumes by year

Year	Construction Expenditures	Lumber[b]	Piling[b]	Posts[c]	Total
	Billions	*Million fbm*	*Million fbm*	*Million ft³*	*Million ft³*
1954	3.670	355	85	—	—
1955	3.915	355	85	—	—
1956	4.247	360	100	—	—
1957	4.586	355	100	—	—
1958	5.178	375	100	—	—
1959	5.237	360	105	—	—
1960	4.913	325	85	—	—
1961	5.301	355	70	—	—
1962	5.727	345	55	—	—
1963	6.256	380	55	—	—
1964	6.488	385	60	—	—
1965	6.523	370	50	—	—
1966	7.208	410	50	—	—
1967	7.531	415	50	—	—
1968	8.120	400	45	11	48
1969	8.119	340	45	11	43
1970	9.196	380	45	12	47
1971	9.519	390	45	10	46
1972	9.826	420	40	10	48

[a] Includes the costs of (1) materials and supplies, (2) labor, and (3) equipment, overhead, and profit, but does not include the costs of preliminary engineering and right-of-way acquisition. All Federal, state, and local expenditures are included.

[b] 1972 estimates from trend lines, figures 1 and 2.

[c] Guardrail, median, and fence posts. In 1971, an estimated 3,600,000 wood guardrail and median posts; 4,022,000 wood fence posts. Conversion factors: 12 board feet per cubic foot; 2.0 cubic feet per guardrail and median post; 0.6 cubic foot per fence post; 6.54 board feet per lineal foot piling.

diameter. Fence-line posts are about 6½ feet long and 4 inches in diameter. Posts used for corner, gate, end, and pull posts for stretching the fence are 6 to 8 inches in diameter and about 8 feet long.

Trends in the Use of Wood Products

During the period 1954 to 1972, expenditures for highway construction increased from 3.7 billion dollars to 9.8 billion dollars; total requirement for lumber and piling generally ranged between 400 and 500 million board feet. Requirements for posts from 1968 to 1972 ranged from 10 to 12 million cubic feet (table 1).

Highway construction expenditures include three cost components: (1) materials and supplies; (2) labor; and (3) equipment, overhead, and profit. The material and supply component has increased from about 30 percent of total costs in the mid-Fifties to about 45 percent in 1972. The increase was brought about because higher highway design standards required more materials and supplies. Improvements in earth-moving, paving, and other road-construction equipment caused a decrease in the labor requirement.

Figure 1.—Lumber-plywood usage factor trend.

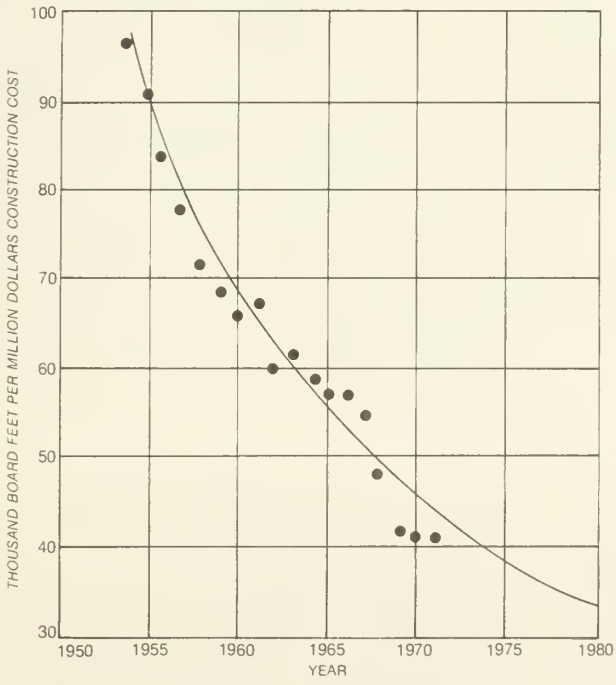
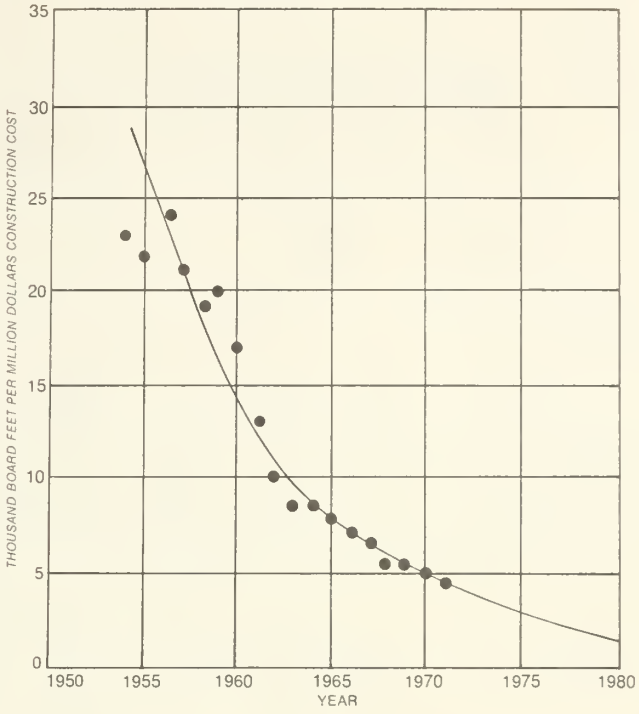


Figure 2.—Piling usage factor trend.



Requirements for lumber and piling did not increase along with requirements for other materials and supplies. Although total expenditures increased about 2½ times from 1954 to 1972, lumber requirements increased only slightly; and piling requirements decreased considerably (table 1). In fact, total requirements have held the 400 to 500 million-board-foot level only because of an increase in total expenditures.

The use of lumber and piling declined because of changes in materials specifications and in construction methods. The downward trends are a result of (1) a reduction in the use of structural forms, and (2) the substitution of competitive materials for wood. Wood-product costs have not affected the downward trends because these costs constitute only 1 to 2 percent of the total cost of materials and supplies.

Many states now permit the use of component parts for highway structures. For example, precast deck slabs are formed at a

factory or field site and delivered to the project site. The use of precast deck slabs reduces the need for structural forms on-site, thus reducing the requirements for wood. Another change that has reduced wood requirements is the trend to use steel, aluminum, and other materials rather than wood for fabricating on-site structural forms.

The use of wood products for bridge members has declined sharply, particularly on interstate and other primary highways. On secondary highways and rural roads, timber piling and lumber are still used to some extent for bridges. The trend in bridge replacement, however, is to steel and concrete products. Other than for buildings at roadside rest areas and for similar non-roadway purposes, lumber and piling do not offer serious competition to steel and concrete products.

Discussion

The use of lumber and piling declined in highway construction because of changes in material specifications and in construction methods. The 400 to 500 million-board-foot level of usage was maintained only because of an increase in total expenditures. Under normal circumstances, the expected trends in usage for these products would show a continuation at about this level.

Within the past several years, however, the nation has begun to experience shortages along with rapid price increases in many of the construction materials derived from nonrenewable resources. Because timber is a renewable resource, it is likely that wood products will become more attractive to the highway construction industry. The wood products industry should act now to demonstrate its ability to meet the demands of the highway construction industry and state highway departments. The most important demand is for a ready supply of uniform high-quality products. At present, the secondary highway and rural road segments of the market show the greatest potential for an increase in use of wood products.

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